COMPARISON OF THREE METHODS OF TEACHING SKIN SELF-EXAMINATIONS

By

TANYA MICKLER

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Abstract of Dissertation Presented to the Graduate School
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COMPARISON OF THREE METHODS OF TEACHING SKIN SELF-EXAMINATIONS

By
Tanya Mickler

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Chairman: James R. Rodrigue, Ph.D.
Major Department: Department of Clinical and Health Psychology

Skin cancer has become a serious concern among health professionals as its incidence has continued to rise in recent years. An emphasis on prevention has been hampered by a lack of awareness by health professionals as to the most effective methods for teaching skin cancer detection and skin self-examination. This study compared three common methods of skin cancer education one might receive at a physician's office: watching a videotape, reading brochures, or receiving one-on-one instruction from a nurse practitioner. Subjects were tested on their skin cancer knowledge, ability to visually discriminate a skin cancer from a non-cancerous growth and their behavioral ability to perform a skin self-examination after receiving skin cancer education (Time 1), and again three weeks later (Time 2). All subjects who received education performed significantly better on the skin cancer measures than those who received non-skin-cancer related education (waitlist) at Time 1 and Time 2. Subjects who read brochures performed significantly better on the behavioral ability to perform a skin examination than all other groups. Demographic variables, such as gender and ethnicity, were not found to be related to performance on the skin cancer measures. Research indicates that health professionals can play a valuable role in teaching skin cancer prevention skills by the cost-effective method of providing skin cancer reading materials to the public.

INTRODUCTION

Skin cancer is the most common form of cancer, with about 600,000 cases occurring each year (Boring, Squires, & Tong, 1991). If left untreated, it can become disfiguring or fatal and so it has become a serious concern among health professionals. Unlike most other forms of cancer, skin cancer can be detected easily and inexpensively in its early stages if one is trained how to look for and identify it. If detected early, skin cancer has a high success rate for complete cure (American Cancer Society [ACS], 1988). Little research has been done to examine methods of teaching detection of skin cancer and skin self-examination, yet the practicing of these skills has been considered important for several years (ACS, 1985; Friedman, Rigel, & Kopf, 1985; Katz & Jernigan, 1991; McGuire, 1985). This study compared three common methods of skin cancer education one might receive at a physician's office, and examined in a controlled fashion the skills of skin self-examination and skin cancer detection. This study has attempted to evaluate whether current methods are useful, which method yields the greatest increase in skills and knowledge, and which produces the greatest changes in skin care behavior over time. This study yields valuable information for health professionals who educate their patients about skin care.

Skin Cancer

Basal cell cancer, squamous cell cancer, and melanoma are all forms of skin cancer. Basal cell cancer is the most common form of skin cancer (Omura, 1987). It grows slowly and accounts for about 20% of skin cancers (ACS, 1988). It spreads more often to other parts of the body than basal cell cancer (White, 1980). Melanoma begins in melanocytes (cells which produce melanin) and accounts for 5% of skin cancer cases. It is more likely to grow and spread to other parts of the body than either basal cell or squamous cell cancer. It accounts for 75% of the deaths due to skin cancer (ACS, 1988). Ramsdell (1989) states that the rise in mortality rate due to melanoma has been less than 1% annually. While he concludes that this may be due to an increased awareness by patients and physicians to the need of early detection, there has been no empirical validation of this issue.

Exposure to ultraviolet radiation, through sunlight, is one of the main causes of skin cancer (Omura, 1987; Robinson & Roenigk, 1980; Sober, 1987). Excessive exposure to sunlight is common in our culture due to the popular belief that having a tan is healthy (Mickler & Rodrigue, in press) and attractive, and that the "outdoor" lifestyle is very popular (Hurwitz, 1988; Truhan, 1991). Also, depletion of the ozone, which has served as a layer of protection against ultraviolet radiation (Amron & Moy, 1991; Coldiron, 1992; Skolnick, 1991), may further account for the rapid increase in skin cancer incidence. Given the dangers and prevalence of skin cancer, researchers are exploring educational efforts as means to help prevent and detect skin cancer.

Such educational efforts have included the provision of information on risk factors for developing skin cancer (Holman & Armstrong, 1984; Ramsdell, 1989) and behaviors which can help prevent skin cancer (American Academy of Dermatology, 1988; Pathak, 1987). They also have included information on how to differentiate a skin cancer from a normal growth

(Berwick, Bolognia, Heer, & Fine, 1991; Schleper, 1991) and the proper method for performing a skin self-examination (ACS, 1985; Friedman et al., 1991).

Risk Factors

In educating people as to factors that may make them more susceptible to developing skin cancer, researchers have identified the following factors as important: personal or family history of malignant melanoma, indoor occupation and outdoor recreational habits (Ramsdell, 1989), sunburning easily and having an inability to tan (more common in people with fair skin as opposed to dark skin). Other factors identified include having light-colored hair (such as red or blond hair) (Elwood, Gallagher, Davison, & Hill, 1985; Holman & Armstrong, 1984), having a high number of moles, or nevi (Holly, Kelly, Shpall, & Chiu, 1987; Holman & Armstrong, 1984), and having a freckling tendency or a history of severe sunburn (MacKie, Freudenberger, & Aitchison, 1989).

Preventing Skin Cancer

To prevent the development of skin cancer, researchers and professional organizations (American Academy of Dermatology, 1988; Council on Scientific Affairs, 1989; Hebert, 1993; Pathak, 1987) advocate the avoidance of sun exposure from 10 a.m. to 3 p.m., when UV-B rays are strongest, the use of wide-brimmed hats, umbrellas and clothing with tight weaving to cover skin, and the use of a sunscreen with a sun protection factor (SPF) of at least 15 when outside, especially during the summer months. Hurwitz (1988) recommends taking extra precautions around surfaces such as snow, sand, concrete and water as they can reflect high amount of the sun's rays. He also suggests taking precautions when in high altitudes or on cloudy days, as these situations leave the skin at risk for exposure. Berwick et al.(1991) add that refraining from the use of tanning booths, using available shade to avoid the sun and avoiding skin contact with chemicals and other forms of ionizing radiation can help prevent skin cancer. Truhan (1991) focuses on the proper use of sunscreen, stating that it should be applied 20-30 minutes before going outside and after activities which involve swimming or perspiring.

Detecting Skin Cancer

Detection of skin cancer at an early stage can result in a better prognosis for treatment. The importance of teaching people how to detect skin cancer was demonstrated by Miles and Meehan (1995) who found that untrained individuals exhibited low ability to distinguish early melanoma from benign skin growths. Many subjects in this study also failed to recognize the urgency of insuring that melanoma be formally checked by a doctor. Fortunately, this information is available and several researchers have offered guidelines in this area.

A common suggestion for detecting skin cancer (ACS, 1990; Berwick et al., 1991; Friedman et al., 1991; Ramsdell, 1989; Schleper, 1991) is to follow the "ABCD" rule. This rule suggests that moles which are asymmetrical, have irregular borders, vary in color, or are large in diameter (greater than 6 mm) are suspicious and should be checked by a physician or dermatologist. The American Cancer Society (1988) warns that a sore that does not heal may be indicative of skin cancer. Omura (1987) states that watching for changes in moles can be especially important in detecting melanoma. He cautions people to watch for changes in coloration, rapid growth, and itching or bleeding in a mole. Further, moles should be examined for changes in surface (rough and scaly or flat and bumpy), elevation, or sensation (tingling or tenderness) (Schleper, 1991). Omura (1987) states that it is vital that melanoma be detected and treated in its early stages as success of treatment is directly related to how deeply the melanoma has invaded the skin. Thinner melanomas detected early often are curable if they are completely removed (Omura, 1987).

Early detection and treatment of skin cancers have yielded high rates of success. The five-year survival rate of people treated for basal cell and squamous cell cancers is 95%. The five-year survival rate for early-stage melanoma is 90%. This rate decreases to 55% if the melanoma has spread to nearby areas, and to 14% if it has spread to distant areas (ACS, 1988).

Skin Self-Examination

Friedman et al. (1985) recommend that people receive an annual skin examination by a physician with monthly self-examinations to compliment it. They assert that a self-examination is free of danger and noninvasive and can be done quickly after one has experience doing it.

Guidelines for performing a standard skin self-examination have included performing a skin exam after a bath or shower (ACS, 1985), as one must be completely undressed; using good lighting and a full-length and a hand-held mirror (Schleper, 1991); and using a "buddy" to aid in examining the hard-to-see areas (Berwick et al., 1991). Using a blow dryer and two chairs or stools also is useful (Friedman et al., 1985), for examining difficult areas to see.

A skin examination should involve a full visual inspection of the front, back, and sides of the body. Thoroughness in inspection is important (Berwick et al., 1991; Friedman et al., 1991; Schleper, 1991), including checking several areas which often are overlooked: the scalp (by use of a blow dryer), between toes and fingers, under the arms, the palms of the hands and soles of the feet, and in the inner leg and genital area (using a stool or chair for support).

Schleper (1991) also suggests that feeling, or palpating, the skin is important for detecting skin cancer.

Teaching Skin Self-Examination

Despite the emphasis by health professionals on the clinical importance of teaching skin self-examination, little scientific research has been done to test whether current methods of teaching are adequate and which method sustains behavior change over time. Some studies examining skin cancer education have not included skin self-examination as an important factor (Mermelstein & Riesenberg, 1992; Robinson, 1990). Several others have researched its training in a nonspecific manner, making it difficult to evaluate.

Lee, Massa, Welykyj, Choo, and Greaney (1991) performed a total skin examination on 707 new dermatology patients. Twenty-one percent of these patients had important incidental findings as a result of the skin cancer screening. Patients were given a brochure of skin protection behaviors, as well as a diagram on how to perform a monthly skin examination and information on the importance of regular skin exams. Of 524 patients checked at follow-up, the researchers found that only 4% returned for an annual skin exam from their physician and only 6% of 50 patients participating in a telephone follow-up said they were following recommendations for sun protection and skin examination. While the researchers felt it was important to educate their patients, they did not assess their teaching methods. Thus, it is difficult to know what and how much patients learned in this study about skin care and skin examination behaviors.

Some researchers have examined teaching skin care and skin examinations through visual aids (videotapes). Cody and Lee (1990), for instance, examined the impact of presenting varied skin cancer videos on the skin cancer knowledge, beliefs, and behaviors of university students. Skin examination behavior was assessed through a few questions on a questionnaire and increased as a result of viewing the videos. In discussing their study, the researchers stated that the presentations emphasized the importance of skin examination but did not provide specific details about the method of doing it. They also assert that education programs need to focus further on quantity and quality of skin examination behavior.

Other researchers have examined verbal teaching methods. Katz and Jernigan (1991) tested a training program which involved teaching students primarily through lecture to detect and prevent skin cancer. This program included education on basic skin cancer facts, skin cancer detection, risk factors, preventive measures, and how to conduct a self-examination of the skin. Further, slides illustrated typical skin cancers. However, there was no opportunity for actual practice of skin self-examination or skin cancer detection. Further, the researchers used a questionnaire to assess subjects' knowledge in these areas and did not observe whether subjects could perform the skills required for skin cancer prevention and detection. While subjects had more knowledge about detecting and preventing skin cancer after the training session, it is unknown if this knowledge would have translated to behavior and if the lecture method is the best method to reach that goal. Maintenance of behavior change over time also was not assessed.

Another study also examined the impact of teaching through verbal (and some written) methods. To evaluate an educational program developed by the National Cancer Institute (NCI), Mcguire (1985) examined the health practices of subjects from families in which one or more members had hereditary cutaneous malignant melanoma, placing the subject at increased risk for the development of skin cancer. The NCI study team developed written guidelines, *Melanoma Prevention Guidelines,* that were shared with subjects at office visits and in a follow-up mailing. These guidelines contained information about monthly skin examination, the importance of receiving a physician examination twice yearly, the importance of minimizing exposure to ultraviolet radiation and special care during puberty and pregnancy. Subjects later were contacted by telephone and questioned as to their educational needs and health practices. Despite their increased risk to skin cancer, there were deficits in the reported skin examination technique of subjects. Only 41% of subjects examined some or all the scalp and only 56% used mirrors to help examine their skin. Further, subjects showed a weakness in their awareness of important changes to watch for in moles. McGuire states that skin exams cannot be optimally effective when patients are uncertain for what they are looking. She suggests that the technique of skin self-examination might be improved by demonstration of skin self-exam with return demonstration, a thorough explanation about the purpose of using mirrors, and more individualized teaching with use of visual aids. Teaching of active skills over provision of reading material is emphasized as an important consideration for teaching skin examination.

There is clearly a need for research to focus on an evaluation of the current methods of teaching skin self-examination. Needed is a comparative study which would examine more than one method of teaching, with more precise measurement of performance of skin care activities, such as skin cancer detection and skin examination. Also important would be an assessment of the best way to yield behavior change in skin care over time. Given the lack of these studies in skin cancer research, one needs to look at other areas of health research for methods of teaching disease prevention behaviors. Breast cancer can be considered a close area of study because research has long focused on the importance of the breast self-examination for breast cancer detection (Alagna, Morokoff, Bevett, & Reddy, 1987; Champion, 1988; Jacob, Penn, & Brown, 1989; Zapka & Mamon, 1982).

Teaching Self-Examination: Lessons from Breast Cancer Research

Thirty-two percent of cancers in women occur in the breast. Breast cancer accounts for 18% of the deaths of women due to cancers (Boring et al., 1991). Since it is unknown how to prevent breast cancer, most research has focused on the early detection and treatment of breast cancer. Like skin cancer, the earlier breast cancer is detected, the better are one's chances for survival and possible cure. Thus, breast self-examinations (BSEs) are recommended for detecting breast cancer at an early stage (Foster et al., 1978; Greenwald et al., 1978; Hughley & Brown, 1981).

Despite much research in the breast cancer area, along with mass media attention, many women still do not perform BSEs. In their review of 335 patients with newly diagnosed breast cancer, Foster et al. (1978) found that only half had performed any BSEs and only one-fourth had performed BSEs on a monthly basis. Another study found only 26% of women performing BSE every two months (Assaf, Cummings, Graham, Mettlin, & Marshall, 1985). Further, even when women are performing BSEs, they may not be doing it correctly. Hilsop, Coldman, and Skippen (1984) found that roughly 90% of the women in their study did not have correct technique in relation to inspection and palpation of their breasts during BSE.

Given the potentially fatal effects of breast cancer for women who do not perform BSEs or perform them incorrectly, research has focused on educating women about the importance and methodology of BSE. Indeed, several studies have compared strategies for teaching breast self-examination. Agars and McMurray (1993) examined nurses' personal BSE practice after their participation in one of three groups of instruction: film and discussion group, booklet-receiving group, or individual teaching group. While all methods improved BSE technique, the film and discussion group showed the most improvement. The researchers stated that subjects preferred the group teaching format to one-on-one teaching as several subjects requested to attend the individual teaching in pairs or groups. Active interactions among participants was an important factor in this study.

Another study (Assaf et al., 1985) compared three methods of teaching BSE: receiving a pamphlet, viewing a videotaped demonstration and receiving a pamphlet, or practicing BSE on a life-like model and receiving a pamphlet. Having an opportunity to practice BSE and receive feedback on a life-like model yielded greater frequency and proficiency of BSE. It also yielded greater confidence in one's ability to do BSE and better lump detection performance than participation in either of the other two groups. The researchers concluded that the more passive methods of teaching BSE, the pamphlet and videotape with pamphlet, were less adequate for teaching subjects the active motor skill of performing a BSE. Further, practice and feedback were seen as necessary components for acquiring the ability to do a competent BSE.

Zapka and Mamon (1982) also emphasize the importance of active skill development for teaching BSE, stating that building psychomotor competencies requires explanation, demonstration and opportunity to demonstrate with feedback. Further, in a review of their BSE research, Pennypacker and Iwata (1990) discuss their finding of the superiority of active training of lump detection on a model and one's own breast over the use of instructional pamphlets to teach BSE. They state that the inadequacy of a pamphlet to teach the skill components of the BSE is a result of the "assumption that a passive cognitive activity (reading) is sufficient to shape a complex sensori-motor skill" (p.#279).

One may conclude from the breast cancer literature that a variety of educational methods may yield improvement in the quality and quantity of BSEs that occur. However, several researchers advocate that a more active approach in education works best. Alagna et al. (1987) state that physicians should not just ask their patients if they perform BSEs but emphasize their importance, practice the technique with patients and offer encouragement. Obviously, the patient _and_ the health professional may need to take a more active approach. Given this information, it would be interesting to see if this is also true for skin cancer, as the research currently indicates. To design a study that would examine this question, it would be useful to review learning and health behavior theory.

Learning and Disease Prevention

If one were to examine materials designed to educate the public concerning health promotion, it is likely that many of these materials assume people learn through observation. This review of the skin cancer and breast cancer literature reveals that researchers and health professionals use videotapes, life-like models, actual demonstrations, and brochures which provide models, pictorial or real, to teach skills like skin and breast examination.

Bandura (1977a) states there are four essential components to learning through observation. In order for a person to learn from watching a model, he or she must pay attention to the model. They also must comprehend and retain (in memory) what the model has taught. A person must then be able to translate this memory into an action. Bandura emphasizes that this is most easily done through practice, with feedback on the performance. Lastly, the person must have motivation to learn the behavior and perform it. This is most likely when the person values the result of performing the activity than if doing it has punishing effects.

Much research has been done to examine the last component: motivation. Presumably, motivation to do an activity is influenced by one's attitudes and beliefs concerning that activity. Rogers (1983) explains "to a large extent, disease prevention and health promotion involve attitude formation and attitude change" (p.#124). Further, the areas of attitude change and formation have been examined on a more general level by social and clinical psychologists for many years. He suggests that theories and findings from previous research in these areas can be applied to the area of health-related behavior to address specific health-related issues, such as prevention behavior.

There are several models in the health-behavior area which examine attitudes and beliefs as these are believed to influence health decisions and actions (Ingham & Bennett, 1990). One such model is the Health Belief Model (Rosenstock, 1974a, 1974b). This model postulates that health-related actions occur as a result of a cost-benefits analysis. Thus, a person chooses a course of action based on the costs associated with that action as well as the likelihood that the action will prevent or reduce the severity of a disease. The primary components of the model basically have remained unchanged since its initial development (Becker et al., 1979; Rosenstock, 1974a, 1974b). The theory holds that several factors influence the likelihood that someone will take a health action. These factors include the perceived severity of contracting the illness, one's perceived susceptibility to contracting the illness, the perceived benefits to taking a particular health action, the perceived barriers which might prevent someone from taking a health action, and internal or external cues which remind one to evaluate these perceptions and act (Becker et al., 1979). This model has undergone extensive research (Janz & Becker, 1984) and continues to serve as a useful model in conceptualizing and predicting health-related behavior in many areas, including skin cancer prevention (Cody & Lee, 1990; Mermelstein & Riesenberg, 1992) and breast cancer prevention (Agars & McMurray, 1993; Champion, 1988; Jacob et al., 1989).

Another model which explores the role of motivation is Rogers' (1975) Theory of Protection Motivation. This theory states that a person's intention to adopt a recommended response depends on three variables: (1) the size of the noxiousness of a depicted event (and thus, its appraised severity); (2) the chance of the occurrence of the event (and thus, one's expectancy of exposure); and (3) the efficacy of the recommended response (and thus, the belief that doing the recommended response will lead to a mediation of the event). It is hypothesized that these variables arouse protection motivation, which Rogers (1975) explains is "an intervening variable that has the typical characteristics of a motive: it arouses, sustains and directs activity" (p.90). Arousal of protection motivation occurs when an event is perceived as highly noxious, highly likely to occur, and the recommended coping response is highly effective in averting or mediating the event.

A more recent revision of this theory (Maddux & Rogers, 1983) includes Bandura's (1977b, 1986) self-efficacy theory as an important fourth component. Self-efficacy involves a person's expectation that he or she has the ability to do a proposed action. This expectation may mediate whether the person attempts a proposed action, how much effort he or she will put into an action once an attempt is initiated, and how long this effort will be sustained in stressful situations. Thus, a person may have the knowledge of how to do a proposed behavior and may even know that doing the behavior will lead to his or her disease prevention/health promotion. However, if the person does not believe that he or she has the ability to complete the proposed action (e.g., the person has low self-efficacy), it is likely the behavior will not be attempted. This revised Protection Motivation Theory is similar conceptually (Prentice-Dunn & Rogers, 1986) to the highly researched Health Belief Model.

These theories offer implicit suggestions for developing an educational study to evaluate the teaching of, and maintenance of, skin self-examination. Bandura's (1977a) discussion of learning would indicate the importance of discussing the value of performing skin self-examinations in enhancing motivation to perform them. Along with this, the Health Belief Model would suggest that the explanation should touch on the benefits of skin self-exams, such as their usefulness in discovering skin cancer at an early stage when it can be treated easily. Further, one would emphasize the no-cost and ease of skin self-exams (fewer barriers to overcome). This might be especially useful for people who refuse to engage in preventive behaviors, such as use of sunscreen, due to various perceived barriers (cost, pale look of skin). According to Rogers (1975), providing information which would inform people about the severity of skin cancer and allow them to assess their own risk for developing it also may affect their motivation to learn skin self-examination. During the actual learning process of the skin self-exam, the provision of encouragement and feedback may help a person's sense of self-efficacy (Bandura, 1977b) for performing one.

Thus, there are many factors to consider in developing methods to educate people concerning skin care and skin examination, and to promote changes in behavior. Considering these, the present study was an attempt to evaluate whether current methods of teaching are useful, which method yields the most increase in skills and knowledge, and which produces the greatest changes in skin care behavior over time.

METHOD

Study Purpose and Hypotheses

The purpose of this study was to evaluate popular educational approaches which aim to teach people about the skills of skin self-examination and skin cancer detection. This study also provided information on skin cancer risks and sun protective behaviors, and attempted to foster changes in skin care behavior. A pilot-study was conducted to develop measures to assess skin examination and skin cancer detection skills. A second study compared three common methods of skin cancer education one might receive at a physician's office: a one-on-one teaching session with a nurse practitioner, viewing a videotape, or receiving brochures, written materials and brief encouragement. This study attempted to examine the skills of skin examination and skin cancer detection in a more controlled manner than in previous studies, as well as evaluate skin care behavior change over time. As a result, this study provides valuable information that health professionals can use to evaluate their choice of patient education programs.

Five primary hypotheses were examined in this study. These are (1) Subjects in all education interventions will show significant improvement in skin cancer knowledge and skill level scores at initial post-intervention assessment, with some decline in scores over time (at final assessment). (2) Subjects in the nurse teaching intervention will show the largest increases in knowledge and skin cancer detection and skin exam skills. This relationship has been found in a similarly designed study teaching breast examination (Assaf et al., 1985) and was hypothesized because individualized teaching offered the only opportunity for subjects to practice their skin examination and skin cancer detection skills as well as receive feedback about their performance. (3) Subjects in the nurse teaching intervention also will yield the most improvement in knowledge and skill level scores over time (at final assessment), as this teaching method will be the most effective initially. (4) Subjects in the video intervention will show a greater increase in knowledge and skill levels than those receiving brochures and written materials and brief encouragement. This was hypothesized because a video is expected to be more engaging and offer a fuller demonstration of skin examination than reading brochures and written materials, which require more visual imagination from the subject. Further, a study examining the best method to teach breast examination (Fletcher et al., 1990) found that physician encouragement did not affect breast exam frequency, specificity, or sensitivity. (5) Subjects in the video intervention will yield more improvement in knowledge and skill level scores over time than the brochure/written materials intervention because the video method will be more effective initially.

In addition to testing hypotheses regarding the skin cancer education, a second goal of the study was to examine four hypotheses regarding skin cancer knowledge and skills. These are (1) Subjects with fairer skin types will obtain higher knowledge and skill scores than subjects with darker skin types. Higher knowledge among these subjects has been found in other studies in this area (Mermelstein & Riesenberg, 1992; Mickler & Rodrigue, in press). Higher knowledge and skill scores are hypothesized because subjects with fair skin are more likely to have experienced the harsh effects of the sun (e.g., sunburn) and may perceive themselves as more susceptible to skin cancer. Thus, they may have sought knowledge and skills previously concerning protection of their skin. (2) In line with the above rationale, subjects from ethnicities with fairer skin types (i.e. Caucasians) will obtain higher knowledge and skill scores than subjects from ethnicities with darker skin types (i.e. Hispanic-Americans, African-Americans). This relationship has been found elsewhere (Mickler & Rodrigue, in press). (3) Subjects with a family history of skin cancer or personal knowledge of someone with skin cancer will obtain higher knowledge and skill scores than those without personal contact with the disease. Higher knowledge among these subjects has been found in another study (Mickler & Rodrigue, in press). Higher scores are hypothesized because personal contact with skin cancer is likely to increase one's knowledge concerning that disease. (4) Females will obtain higher knowledge scores than males. This relationship has been found in other studies in this area (Cody & Lee, 1990; Mermelstein & Riesenberg, 1992). Females also will obtain higher skill scores than males.

Subjects

Participants were 143 students recruited from undergraduate psychology courses. Subjects who had received explicit skin cancer detection or skin examination instruction in the past year from a health professional were excluded. The subjects ranged in age from 17 to 31 ($\underline{M}$ = 18.47, $\underline{SD}$ = 1.80). Gender, family history of skin cancer, personal knowledge of someone with skin cancer, ethnicity and skintype characteristics of the subject sample can be found in Table 1. One hundred and thirty-eight subjects returned for the second assessment.

Measures

Prior to this study, pilot-testing was completed on 42 students to develop the measures to assess skin examination and skin cancer detection and to train research assistants in

Table 1.

Gender, Ethnicity, Skintype, Family History of Skin Cancer, and Personal Knowledge of Someone with Skin Cancer Characteristics of the Subject Sample

	Frequency	Percent
GENDER		
Female	85	59.4
Male	58	40.6
ETHNICITY		
Caucasian	109	76.2
African-American	3	2.1
Hispanic-American	21	14.7
Asian-American	10	7.0
SKINTYPE		
Skintype 1	14	9.8
Skintype 2	21	14.7
Skintype 3	70	49.0
Skintype 4	38	26.6
FAMILY HISTORY OF SKIN CANCER		
Yes	40	28.0
No	103	72.0
PERSONAL KNOWLEDGE OF SOMEONE WITH SKIN CANCER		
Yes	65	45.5
No	78	54.5

administering these measures to subjects. All measures can be found in the appendix, with the exception of the Visual Picture Test.

The Skin Examination Rating Scale (SERS) is a 28-item pass/fail scale designed to assess proficiency of skin self-examination for skin cancer. Scores can range from 0 to 28. This instrument was developed from an examination of materials published by the American Cancer Society, as well as current researchers in the fields of oncology (Berwick et al., 1991) and dermatology (Friedman et al., 1985; Schleper, 1991). Items were selected to address the recommendations contained within these materials for achieving a thorough skin examination (i.e. an emphasis on the importance of checking one's scalp is reflected by an inclusion of an item assessing the subject's performance on this task) . The SERS underwent a review for accuracy by a licensed dermatologist. Three dermatology professionals then were asked to describe a typical skin examination given to one of their patients. The SERS was compared with these descriptions and required no changes afterwards, indicating good construct validity.

The Visual Picture Test (VPT) is a 14-picture task which requires the subject to visually discriminate skin cancers from non-cancerous (benign) moles/growths. Items are rated correct/incorrect. Sixteen items considered "common" benign growths or early stage skin cancers were selected by a licensed dermatologist to reflect typical skin examination sightings. The skin cancer pictures were selected to differ along the following dimensions: asymmetry, border regularity, color and diameter. These dimensions are considered important to detecting skin cancer by the American Cancer Society, as well as current researchers in the fields of oncology (Berwick et al., 1991; Friedman et al., 1991; Ramsdell, 1989) and dermatology (Schleper, 1991). The VPT then was administered to three dermatology professionals. Two pictures which were not accurately discriminated by two of the three professionals were deleted. The remaining items were accurately discriminated by all three professionals. Of the fourteen total items, seven pictures are of benign growths and seven are of early stage skin cancers.

The Knowledge Questionnaire (KQ) is a 20-item questionnaire (7 multiple-choice, 13 true/false) designed to assess knowledge of the seriousness and prevalence of skin cancer, risk factors for skin cancer, and knowledge of sunscreen use. An additional question on the Knowledge Questionnaire, which is not scored, asks the participants to rate their perceived skin cancer knowledge using a 5-point Likert scale (1=poor, 5=excellent). This measure has demonstrated adequate internal consistency (alpha = .73), good two-week test-retest reliability (.74), and good construct validity (Mickler & Rodrigue, in press).

A Demographic Data Form (DDF) also was completed by each subject. Subjects were asked to provide basic demographic information including age, ethnicity, gender, skin type, family history of skin cancer, sunburn history, and previous exposure to knowledge concerning skin cancer and source of that exposure.

Procedure

Subjects were recruited through undergraduate psychology classes. Prior to beginning the study, subjects who agreed to participate were screened for gender, skin type (for screening purposes, skintypes 1 and 2 were grouped as "lighter skintype" and skintypes 3 and 4 were grouped as "darker skintype") and personal contact with skin cancer (having a family history of skin cancer or knowing someone with skin cancer). This information allowed for the estimation of the number of subjects in each of 8 groups across the 3 variables (i.e. the number of males with a lighter skintype with no personal contact with skin cancer; the number of males with a darker skintype with no personal contact with skin cancer and so on). A grid system was developed to evenly stratify each of the 8 groups across the interventions. Prior to attending the intervention, subjects were informed that they would be participating in a study concerning skin care and skin cancer. Subjects were asked to wear a short-sleeve shirt and shorts to the intervention for the purpose of completing skin cancer-related tasks. Immediately prior to the intervention, subjects were requested to complete an informed consent form and demographic data form. Subjects then were placed into one of the four interventions, according to their stratification variables, on a rotating basis (for example, the first female with lighter skintype and no personal knowledge or family history of skin cancer would be placed in Intervention 1, the next similar female would be placed in Intervention 2, and so on). Following the intervention, subjects were asked to complete the VPT, the KQ and a skin examination. Two intervention-blind raters assessed each subject's skin examination. A wait-list control group, which did not receive an intervention immediately, also was asked to complete these measures. All subjects were asked to return three weeks later to complete these measures a second time. The wait-list control group received the intervention hypothesized to be the most effective at that time, the nurse teaching intervention. At the completion of their participation, all subjects received research credit and, if requested, were provided feedback as to their skin cancer knowledge and skills as well as information concerning the goals of this study.

No pre-testing was performed on subjects in this study because it was hypothesized that doing so might prime subjects to attend to specific information during the intervention (i.e.

how to do a skin examination) which might bias the results. The omission of pre-testing also supported the ecological validity of the study, as one of the study's purposes was to evaluate common educational methods that might be utilized at a physician's office, a setting where pre-testing is unlikely to occur.

Confidentiality of each participant's information was protected by use of coded numbers on all written materials and the information is stored in a locked office at the Health Sciences Center.

Interventions

There were four interventions offered, three of which offered education concerning skin cancer risk factors, cancer prevention behaviors, a method to recognize skin cancer and a method to perform a skin examination for skin cancer. The waitlist intervention offered peer leadership information. All interventions were delivered individually and for the same amount of time (15-20 minutes) to approximate an actual visit with a health professional.

Intervention 1 (n = 39) involved watching a video, *Skin Cancer: Preventable and Curable* (Skin Cancer Foundation [SCF], 1992) which includes information on skin cancer, how to recognize it, and different skin types and their vulnerabilities to the sun. It also included a demonstration of how to do a total body skin exam, and tips on prevention.

Intervention 2 (n = 35) involved receiving several brochures, including *The Many Faces of Malignant Melanoma* (SCF, 1985), *Skin Cancer: If You Can Spot It, You Can Stop It* (SCF, 1992), *Basal Cell Carcinoma: The Most Common Cancer* (SCF, 1986) and *Squamous Cell Carcinoma: The Second Most Common Skin Cancer* (SCF, 1990). Subjects were encouraged to read the brochures thoroughly.

In Intervention 3 (n = 33), subjects received one-on-one training by a nurse practitioner for performing a skin self-examination and visually recognizing skin cancers. In this intervention, subjects had the opportunity to practice and receive feedback as to skin examination skill. Subjects also had an opportunity to view brochures of skin cancers to enhance their recognition skills.

In Intervention 4 (n = 36), subjects served as a wait-list control group. Subjects received no skin cancer education until both assessments were complete. At that time, subjects received the nurse teaching intervention.

A review of the skin cancer literature provided guidelines for information considered important to present in a skin cancer educational effort (American Academy of Dermatology, 1988; American Cancer Society, 1988; Berwick et al., 1991; Friedman et al., 1991; Omura, 1987; Ramsdell, 1989; Schleper, 1991). The video and brochures chosen for this study were developed by the Skin Cancer Foundation. These materials were chosen because they provided the necessary information and appeared to do this in a clear and thorough manner.

A script then was developed from the video as it was judged that the video provided a thorough presentation of the important material to be included in the interventions. The purpose of the script was to ensure that all treatment interventions provided the same information as one another. To do this, the script was given to the nurse practitioner who provided the one-on-one teaching. During the pilot study, the nurse's presentation was observed and she received corrective feedback until she achieved 3 perfect presentations of the material (no information was omitted). During the study, she periodically was observed to assure she maintained treatment fidelity. Brochures were chosen which presented the same information as the video, and these were checked by a comparison with the script.

RESULTS

Description of Sample

Subjects ranged in number of painful sunburns in their lifetime from 0 to 30 (M = 4.7, SD = 5.81, Mode = 2) and in beach visits for the past year from 0 to 365 (M = 27.64, SD = 48.94, Mode = 10). Seventy percent felt they were generally informed about skin cancer and sun protection. Of those subjects, 43 percent indicated they had received information about skin cancer and sun protection from a television, newspaper or magazine, 24 percent received information from a doctor or health professional, 41 percent from a family member or friend, 32 percent from a classroom setting, and 1 percent from other sources. Seventy-eight percent indicated that they felt a suntan enhances their appearance.

Measurement Analyses

Several analyses were conducted on the SERS, VPT, and KQ to assess their psychometric adequacy in this study. These analyses included the following:

1. Internal consistency reliability--Anastasi (1988) suggests that a reliability coefficient of .80 or higher is desirable.
2. Item analysis using Pearson's Product Moment Correlation which allows for inspection of which items are most relevant and appropriate to the measure--The point-biserial formula was used, as a dichotomous variable (correct vs. incorrect responses on test items) was correlated with a continuous variable (total score).
3. Plotting of total test scores to examine frequency distribution--A symmetrical, approximately normal distribution of scores suggests that the measures are neither too easy nor too difficult (Nunnally, 1978).

Skin Examination Rating Scale

Internal consistency reliability was calculated for the Skin Examination Rating Scale (SERS) using the KR-20 version of the coefficient alpha. The KR-20 version is used with measures with dichotomous items (Nunnally, 1978). As each subject was evaluated on the SERS by two raters, analyses were performed on two sets of SERS data (SERS1 data, SERS2 data). The coefficient alpha for the total scale was .84 (SERS1 data) and .85 (SERS2 data). Corrected item-to-total correlations ranged from .04 to .56 on the first set of data and ranged from .13 to .55 on the second set of data (see Table 2). Dropping items with low item-to-total correlations does not significantly increase the coefficient alpha so all subsequent analyses were completed on the entire (28-item) Skin Examination Rating Scale.

Interrater reliability was measured for the Skin Examination Rating Scale using the Pearson Product Moment Correlation as two trained undergraduate research assistants independently observed subjects performing skin examinations. Interrater reliabilities ranged from .48 to 1.0 (see Table 2), with an interrater reliability of .90 for the Total SERS scores. Observer agreement or disagreement on each item of the SERS also was noted and the number of agreements was divided by the number of agreements plus disagreements for each subject. These ranged from 76% to 99%, with an average of 86% agreement between the two raters. This provides another measure of the degree of correspondence between raters.

Test scores ranged from a low of 3 to a high of 27 (SERS1 data: M = 14.10, SD = 5.43, SERS2 data: M = 14.07, SD= 5.67) indicating considerable variability among the scores. Total scores appear normally distributed, with a kurtosis of -.522 and a skewness of .05 in the SERS1 data, and a kurtosis of -.641 and a skewness of .17 in the SERS2 data.

Table 2.

Item-to-Total Correlations and Interrater Reliabilities for Individual Items of the Skin Examination Rating Scale

Skin Examination Rating Scale Item	Corrected Item-to-Total Correlations (SERS1 data)	Corrected Item-to-Total Correlations (SERS2 data)	Interrater Reliability
SERS 1	.1218	.1331	1.00
SERS 2	.3338	.3553	.82
SERS 3	.4180	.3919	.90
SERS 4	.4476	.3973	.67
SERS 5	.3212	.3891	.71
SERS 6	.3740	.4908	.82
SERS 7	.0402	.1917	.51
SERS 8	.2531	.1664	.67
SERS 9	.3990	.3903	.58
SERS 10	.3135	.3640	.62
SERS 11	.2336	.3518	.60
SERS 12	.1571	.3285	.53
SERS 13	.1685	.1448	.66
SERS 14	.2567	.1638	.58
SERS 15	.2599	.3588	.56
SERS 16	.2532	.3913	.50
SERS 17	.5674	.4666	.65
SERS 18	.5268	.4774	.69
SERS 19	.4793	.4217	.56
SERS 20	.4374	.4410	.55
SERS 21	.4229	.3212	.49

Table 2--continued

Skin Examination Rating Scale Item	Corrected Item-to-Total Correlations (SERS1 data)	Corrected Item-to-Total Correlations (SERS2 data)	Interrater Reliability
SERS 22	.4454	.4155	.50
SERS 23	.4700	.4785	.50
SERS 24	.5209	.5232	.54
SERS 25	.4940	.5597	.64
SERS 26	.4940	.5570	.61
SERS 27	.5004	.5204	.78
SERS 28	.4978	.5310	.73

Visual Picture Test

Internal consistency reliability was calculated for the Visual Picture Test using the KR-20 version of the coefficient alpha. The coefficient alpha for the total scale was .46. Corrected item-to-total correlations ranged from .00 to .34 (see Table 3). Dropping items with low item-to-total correlations does not significantly increase the coefficient alpha so all subsequent analyses were completed on the entire (14-item) Visual Picture Test. Test scores ranged from a low of 3 to a high of 14 (M = 10.7, SD = 2.0), indicating some variability among the scores. The distribution of the total scores was somewhat negatively skewed with a kurtosis of 1.01 and a skewness of -.852.

Knowledge Questionnaire

Internal consistency reliability was calculated using Cronbach's coefficient alpha. The coefficient alpha for the total scale was .49. Corrected item-to-total correlations ranged from -.10 to .33 (see Table 4). Dropping items with low item-to- total correlations does not significantly increase the coefficient alpha so all subsequent analyses were completed on the entire (20-item) Knowledge Questionnaire. Total test scores ranged from a low of 9 to a high of 19 (M = 15.15, SD = 2.25), indicating variability among the scores. The distribution of the total scores was slightly negatively skewed with a kurtosis of -.162 and a skewness of -.457.

Intervention Effects

One-way analyses of variance and t-tests were used to examine differences between participants in the four conditions according to demographic variables (ethnicity, skintype, family history of skin cancer, personal knowledge of someone with skin cancer, and gender) at

Table 3.

Item-to-Total Correlations for Individual Items of the Visual Picture Test

Visual Picture Test Item	Corrected Item-to-Total Correlations	Visual Picture Test Item	Corrected Item-to-Total Correlations
VPT 1	.2556	VPT 8	.1570
VPT 2	.1363	VPT 9	.0476
VPT 3	.0079	VPT 10	.1776
VPT 4	.1113	VPT 11	.2163
VPT 5	.2953	VPT 12	.0844
VPT 6	.1380	VPT 13	.3363
VPT 7	.3440	VPT 14	.1154

Table 4.

Item-to-Total Correlations for Individual Items of the Knowledge Questionnaire

Knowledge Questionnaire Item	Corrected Item-to-Total Correlations	Knowledge Questionnaire Item	Corrected Item-to-Total Correlations
KQ 1	.2268	KQ 11	.1144
KQ 2	.2325	KQ 12	.1700
KQ 3	.2847	KQ 13	.1121
KQ 4	.1043	KQ 14	.0520
KQ 5	.2028	KQ 15	.2724
KQ 6	.0756	KQ 16	.2469
KQ 7	-.1042	KQ 17	.3365
KQ 8	-.0780	KQ 18	-.0043
KQ 9	.2813	KQ 19	.1858
KQ 10	.1090	KQ 20	.0608

initial and follow-up assessments. There were no significant between-group differences on any of these variables at either assessment. Given the absence of relationships between demographic variables and skin cancer knowledge and skill scores, it was possible to focus exclusively on examining the main effects of intervention. The hypothesis that all subjects who received skin cancer education would perform significantly better on all skin cancer measures than the control group at Time 1 and Time 2 was supported. However, the following hypotheses did not receive support: nurse teaching would show the largest increases in skin cancer knowledge and skills at both assessments; and video teaching would show greater increases in knowledge and skills than the brochures at both assessments. None of the treatment interventions uniformly yielded larger knowledge and skill increases over the others. An examination of performance on each component (skin self-examination skill, visual discrimination skill, and skin-cancer knowledge) by intervention yields further explanation.

Means and standard deviations for the dependent measures at each assessment period by intervention are reported in Table 5. Post-hoc tests were completed using t-tests or the Student-Newman-Keuls test. A limitation of the Student-Newman-Keuls test is that it does not control for family-wise error rate.

Skin Self-Examination

To examine the differences in behavioral ability of skin self-examination across groups, a 4 (group) X 2 (assessment time) repeated measures ANOVA was conducted. Analyses were performed on two data sets (SERS1 data, SERS2 data), given that two raters assessed each skin examination. Analyses revealed a significant effect for Group, $\underline{F}$ (3, 134) = 25.05, $\underline{p}<$ .0001 (SERS1 data), and $\underline{F}$ (3,134) = 21.97, $\underline{p}<.0001$ (SERS2 data). Post hoc Student-

Table 5.

Means and Standard Deviations for the Dependent Measures at Each Assessment Period By Intervention

	VIDEO		BROCHURE		NURSE		WAITLIST		
Measure	T1	T2	T1	T2	T1	T2	T1	T2	Effect
SERS1									
M	13.76	13.63	18.51	18.31	15.15	14.90	9.22	10.54	G
SD	4.43	4.27	4.78	4.45	3.55	4.62	4.42	6.08	
SERS2									
M	13.56	13.57	18.65	18.42	14.96	14.96	9.33	10.45	G
SD	5.04	4.75	4.60	4.79	4.32	4.90	4.51	5.86	
VPT									
M	11.00	10.92	10.54	10.45	11.66	11.21	9.66	9.51	G
SD	1.87	1.80	1.70	1.80	1.65	1.67	2.24	2.18	
KQ									
M	16.28	15.94	16.00	16.02	14.63	15.37	13.54	14.15	G x T
SD	1.89	2.25	1.76	1.72	2.01	2.13	2.22	1.82	

Note. T1 = initial assessment, T2 = 3-week follow-up assessment; G= Group effect, G x T = Group by Time effect

Newman-Keuls tests indicated that, while all education groups performed significantly better than the Waitlist group, the Brochure group performed significantly better than the Video or Nurse group (Table 5). As there was no evidence of a significant effect for Time, results suggest that subjects' performance at Time 2 was comparable to their performance at Time 1, with no significant improvements or decreases.

Visual Skin Cancer Discrimination

A 4 (group) X 2 (assessment time) repeated measures ANOVA was conducted to examine ability, across groups, to visually discriminate a skin cancer from a non-cancerous growth. Analyses revealed a significant effect for Group, $F\ (3,134) = 8.20$, $p < .0001$. Post hoc Student-Newman-Keuls tests indicated that the Nurse group performed significantly better than the Video group, both of which performed significantly better than the Brochure or Waitlist groups (Table 5).

Skin Cancer Knowledge

A 4 (group) X 2 (assessment time) repeated measures ANOVA was conducted to examine skin cancer knowledge across groups. Analyses revealed a significant effect for Time, $F(1, 133) = 4.68$, $p < .03$, and a significant effect for Group, $F(3, 133) = 11.54$, $p < .0001$, and a significant Group X Time interaction $F(3, 133) = 3.20$, $p < .02$. All skin cancer education groups showed significantly more knowledge than the Waitlist control group at both the initial and follow-up assessments (Table 5). Post-hoc Student-Newman-Keuls tests indicate that the Brochure and Video groups performed significantly better than the Nurse group at the first assessment (Table 5). Simple effects of assessment time were significant for the Nurse and

Waitlist groups. Post hoc t-tests showed significantly more knowledge in the two groups at the follow-up assessment.

DISCUSSION

Skin Cancer Knowledge and Skills

Results of this study support the hypothesis that skin cancer education can be effective in improving skin cancer knowledge, visual skin cancer discrimination and skin self-examination skills. The results suggest that improvements in knowledge and skills can be retained over time. However, in contrast to first thought, no single intervention was found to produce uniform improvements in knowledge and skills compared to the other interventions; different forms of education produced differing levels of skin cancer skills and knowledge.

There was not support for the hypothesis that individualized teaching from a nurse practitioner would yield the greatest benefits in skin cancer knowledge and skills in comparison to the other interventions. Nor was there support for the hypothesis that the video intervention would be more uniformly effective in increasing skills and knowledge than the brochure intervention. Instead, the results suggest that increases in skin self-examination ability or skin cancer knowledge or ability to visually discriminate a skin cancer were related to the specific education received. A focus on each component (skin examination skill, visual discrimination skill and knowledge), and the education which most increased it, may serve to elucidate these results.

Skin Self-Examination

To begin this focus with what might be the most surprising result is to examine the skill of skin self-examination. Original thought was that this behavioral skill could best be taught in an individualized manner because of the opportunity for practice and feedback afforded by a responsive model. Research has supported this line of thinking (Assaf et al., 1985). Although there was no opportunity to receive feedback, watching a video was expected to be the second best way in which to learn about skin self-examination as it was expected to be a fairly engaging activity. Reading brochures appeared to offer only the quality of being informative, and this intervention was expected to yield the smallest amount of skill improvement. Surprisingly, it produced the greatest improvements in the skill of skin self-examination.

One explanation for this may lie in the manner in which the nurse teaching sessions occurred. Having the opportunity to practice and receive feedback from a health professional only may yield improvements in performance when a subject uses this opportunity. Problems in utilizing the opportunity occurred in this study, possibly due to some unanticipated factors, such as subjects' comfort level. At the conclusion of the study, the nurse reported a general difficulty in having subjects practice skin self-examination in front of her. She indicated that she perceived this difficulty was due to embarrassment or shyness on the part of the subjects. Discomfort may have prohibited subjects from utilizing the opportunity to practice and receive feedback. Feelings of discomfort would be expected to interfere with the attentional and motivational aspects of learning, and hence, hinder the learning process. If subjects were not taking advantage of the opportunity for practice and feedback, they likely were missing the most effective factor in this intervention.

Another possibility for the surprising results may have to do with the manner in which the material was presented in the nurse teaching intervention. It is possible that the subjects did not find the presentation to be engaging and so, experienced boredom. Or subjects may have experienced frustration if they perceived the presentation to be too lengthy or disorganized to facilitate their learning of the material. These feelings also would interfere with the attentional and motivational aspects of learning, hindering the learning process. Information concerning SSE was given at the end of the skin cancer presentation and it is possible that subjects' attention already may have waned by that time. Further, if subjects experienced difficulty in learning the material in an "easy" manner or felt a lack of confidence in the material learned, this may have inhibited their drive to take advantage of the opportunity to practice and receive feedback of their SSE skill.

The experience of reading brochures may not have produced feelings of discomfort, boredom or frustration for subjects. Along with the ability to learn at one's own pace, the reading materials also may have offered better organization and/or clarity of presentation. These qualities may have enhanced the learning process and allowed for significantly improved performance, despite the lack of opportunity for practice and feedback of SSE.

Visual Skin Cancer Discrimination

Originally, the individualized teaching intervention was hypothesized to yield the best performance on all skin cancer skills. This hypothesis held true for only one skill. Subjects receiving instruction from the nurse practitioner demonstrated better visual discrimination ability of skin cancers compared to subjects receiving other instruction.

While all skin cancer interventions offered guidelines to use in distinguishing a potential skin cancer, and displayed pictures of the different types of skin cancers, it was only in the nurse teaching intervention that there was an opportunity for interaction and discussion concerning each picture and how it followed the guideline. Unlike the SSE skill, subjects were noted to take advantage of this opportunity, as the nurse indicated that several subjects used their time to ask her questions about discerning skin cancers. There are several possibilities why this occurred.

Visual discrimination information was provided early in the presentation, perhaps before subjects experienced boredom or frustration. The information provided was brief and clearly structured, possibly making it very easy to learn. Further, practicing visual discrimination may have been a more comfortable experience than the practicing of SSE as it involved the scrutinizing of pictures rather than the scrutinizing of one's own body. Taking advantage of the opportunity for practice and feedback may occur more readily when subjects feel more comfortable, engaged and confident in the learning process. Thus, the apparent greater utilization of opportunity of practice and feedback in visual discrimination skill may explain the higher performance on the VPT by subjects working with the nurse.

Skin Cancer Knowledge

All subjects who received skin cancer education showed significantly more skin cancer knowledge at the first assessment than the waitlist group. However, subjects who watched a video or received brochures performed significantly better than subjects receiving nurse instruction. This result was unexpected but appeared more comprehensible on closer examination.

As discussed earlier, the nurse teaching intervention may have been experienced as boring, uncomfortable or frustrating. Subjects may have been uncomfortable asking the nurse to repeat or clarify misheard or misunderstood concepts, or slow down if she was reviewing information too quickly. Subjects also may have had difficulty discerning important highlights of the material, as some aspects of the material were presented orally. It is possible that the amount of information may have been too great to process and remember in the time period.

These disadvantages may not have impacted performance of visual discrimination because that was a skill which involved the learning of a few specific points. However, the Knowledge Questionnaire examines skin cancer knowledge in a more general fashion, assessing knowledge across a wide area of subject matter versus a limited set of guidelines. When the subjects' main focus shifted to listening to the nurse and trying to learn and remember a variety of facts, feelings of discomfort or frustration may have been more likely to surface. This especially might be true if subjects believed there was too much information to remember. It also is possible that the subjects experienced boredom. Any of these feelings likely would have hindered the overall learning process, which would reduce subjects' general knowledge level. This may explain why subjects receiving the nurse teaching scored more poorly on the KQ at the first assessment than subjects watching the video or reading the brochures.

At the second assessment, both the nurse and waitlist groups had significantly increased their KQ scores in comparison to their first performance, while the video and brochure groups performed comparably at both assessments. An explanation for this may have to do with the KQ itself. This measure allows for interpretation of one's own performance. The presence of multiple-choice questions gives subjects the feedback that a correct answer is available, and if a subject is aware that he or she does not know which answer is correct, then he or she may be able to tell how well he or she is doing on the KQ. This was not true for the SERS as subjects were not aware of the scoring criteria for this measure and did not receive feedback as to their performance during the assessment. Subjects who performed poorly on the KQ during their initial assessment, such as those in the nurse and waitlist interventions, may have had an awareness of their poor performance. This awareness may have motivated subjects to attempt to learn more about skin cancer during the time from the first assessment to the second. This would explain their significant improvements on the KQ at the second assessment.

One might argue that the VPT also allowed for interpretation of one's performance and it is possible that it did to a limited extent. However, subjects seeking skin cancer information on their own during the interim between assessments would have greater ease learning answers to questions on the KQ (such as the SPF level most often recommended by doctors) than in learning to recognize the specific skin cancers on the VPT items. This might explain the improved performance on the KQ at Time 2 when there was no improved performance on the VPT.

Implications

The results were surprising. It had been taken for granted that subjects would avail themselves of the opportunity to practice and receive feedback on their SSE skill. However, it appears that some unexpected factors, such as feelings of discomfort, boredom or frustration, may have been at work in determining if subjects actually did so. Further, it appears that these factors also may have influenced the general learning process during the intervention, perhaps allowing other factors, such as the ability to learn at one's own pace, to make a greater impact in improving performance. The interaction and discussion utilized in the nurse teaching may have improved skin cancer visual discrimination ability, but difficulties with discomfort, pace and organization of materials in this type of instruction may have hindered the learning of general skin cancer facts. Those watching the video may not have encountered these difficulties but also did not enjoy the benefits. These results suggest that a further assessment and refining of the interventions and how information is delivered may be worthwhile for future research.

It is important to note that the results of this study were heavily influenced by the specific interventions offered. While attempts were made to choose the most clear and engaging materials for presentation and to prepare the nurse to be a clear and engaging speaker, these qualities may have differed across intervention. The nurse's presentation may not have been as dynamic as needed for holding subjects' interest level over an extended period of time. A more dynamic presenter might have yielded different results. If the nurse's presentation was not as clear and organized as needed, a further refinement of the nurse instruction which included a clear outline of significant points (with written highlights accompanying verbal lecture) might increase performance. It also might provide researchers more information about the importance of organization of materials for learning about skin cancer.

Another possibility has to do with the relationship between the health professional and the patient. Subjects in this study were meeting the nurse for the first time and may not have had any particular motivation to learn the materials or engage in a practice opportunity (other than their role as research subjects). However, patients being encouraged by a physician or nurse with whom they have an ongoing, (hopefully) positive relationship may be more motivated to overcome feelings of discomfort, boredom or frustration to engage in a practice opportunity.

It might be fruitful to specifically assess subjects' utilization of interaction and feedback opportunities as well as conduct post-participation assessment. One focus may involve questioning subjects about their perceived experiences of each intervention, and querying what factors they felt enhanced or hindered their performance on the various tasks, and influenced their decision to take advantage of the opportunity for practice and feedback. Specific questioning regarding possible feelings of discomfort, boredom or frustration also might be included. This information would be helpful in further elucidating the results reviewed.

All of this points to the need for further evaluation of interventions prior to further studies. Empirical assessment of some of the qualities considered important for effective learning, such as organization of material and ability to maintain interest, would allow for greater confidence in available interventions.

Demographic Issues

As has been found in other studies (Cody & Lee, 1990; Mermelstein & Riesenberg, 1992; Mickler & Rodrigue, in press) demographic variables, including ethnicity, skin type, gender and having personal contact with skin cancer, were hypothesized to influence skin cancer knowledge and skills. Surprisingly, there were no significant differences in performance in relation to any of the demographic variables.

A possible explanation for the lack of variation according to demographics may rest within the study sample. Subjects participating in this study were similar in several dimensions, including age and socioeconomic status. However, the most important similarity among subjects may be in educational level. Mickler and Rodrigue (in press) found that of all examined demographic variables, educational level was one of the most significant variables related to higher skin cancer knowledge scores. Assuming this relationship is true for this study, it is likely that the similarities in education might mask or override smaller differences among other dimensions.

Educational level may have impacted the results in at least one manner: All subjects were college students, a sample known for being intelligent and having the ability to utilize reading materials to learn. It is possible that reading materials are a more common and comfortable medium for them to use than other people would usually find. Further, all subjects had the opportunity to earn research credits for their participation, which likely influenced their attention and motivation. It would be worthwhile to examine how well reading materials were utilized by a group of people who had no exterior motive to read them or were not as highly educated. It also might be interesting to examine if interventions requiring less personal work (watching a video versus reading brochures) might be more effective in situations where there is not an external motivator.

These points demonstrate the need for this study to be replicated with a more diverse subject sample. The effect of a more representative range of educational level, socioeconomic status and age in subjects would be important to examine. It is suggested that increased heterogeneity in the subject sample might allow greater expression of differences along ethnicity, gender and personal contact dimensions.

Measurement Issues

Examining the utility of the skin cancer measures was an important goal of this study. As the interest in skin cancer research begins to grow, the development of measures to use in this field is an important task. Results of this study suggest that the measures are worthwhile; however, some may require refinement for future use.

Skin Examination Rating Scale

Results of this study support the psychometric adequacy of the Skin Examination Rating Scale (SERS) for measuring subjects' proficiency of skin self-examination for skin cancer. The results suggest that the SERS is a fairly homogenous measure of skin cancer knowledge. There is evidence which indicates that raters using this measure can be trained to rate in a reliable manner. Low levels of skewness and kurtosis in the frequency distribution of the SERS suggest it has an appropriate difficulty level. Review and approval of this measure for thoroughness by a licensed dermatologist lends support for the content validity of the SERS. Its similarity in thoroughness to the descriptions of skin examinations offered by three dermatology professionals indicates good construct validity. These results are very encouraging for the future use of the SERS.

Visual Picture Test

Disappointingly, some measures of psychometric adequacy were less than optimal for the Visual Picture Test, indicating the need for further refinement of this measure. The results indicate that the VPT has a low level of internal consistency reliability. Given that all of the items have corrected item-to-total correlations below .34, it appears important that some items should be refined or deleted and new items developed and added to the VPT in future studies. This may provide researchers with more opportunity to attain a higher level of internal consistency reliability. The addition of new items reflecting a more appropriate difficulty level also may improve the less than optimal level of skewness in the frequency distribution.

Despite this, the VPT appeared to have good content validity as demonstrated by the ability of three dermatology professionals to correctly discriminate all items of the final version.

These results offer more encouragement for the use of the VPT in future research. Given that there is much research to be done in further understanding the behavioral aspects of skin cancer prevention, and that there is a lack of an alternative measure to assess skin cancer visual discrimination ability, it appears that it would be a worthwhile investment to continue research using a refined version of the VPT.

Knowledge Questionnaire

In contrast to previous work with the Knowledge Questionnaire (KQ) (Mickler & Rodrigue, in press) the results of psychometric assessment from this study were less encouraging. Internal consistency reliability was low and all item-to-total correlations were below .30, indicating that homogeneity of the instrument was low. It appears that the KQ also requires further refinement before future research use. The development and addition of new items, as well as the deletion of more extraneous items, might be beneficial in increasing the reliability level of this measure.

Previous work has offered support for the validity and reliability of the KQ. Further, this measure is one of the few assessment instruments available for this area of research. Given this, future work focused on further improving the reliability of the KQ would be beneficial and important for continued work in skin cancer prevention and education.

Future Implications

While the pattern of results was surprising at times, the overall result was not. That skin cancer education can make a lasting difference in skill level and knowledge is not surprising when one reviews the factors that went into developing the teaching methods. From a review of the Health Belief Model and Rogers' (1975) Theory of Protection Motivation, all skin cancer interventions focused on the benefits and efficacy of skin cancer prevention efforts, such as skin self-examination. The skin cancer interventions emphasized the absence (or minuteness) of barriers to address in completing prevention-oriented tasks. The value of these actions was emphasized, as Bandura's (1977a) discussion of learning indicated it would enhance motivation in learning and performing the skin cancer tasks. All skin cancer interventions provided information about the severity of skin cancer and one's susceptibility to it to further increase one's motivation to learn and perform the skin cancer tasks. These efforts worked, as was expected, and now this study can offer empirical validation for current methods of skin cancer education and their ability to foster behavior change over time. Thus, the most important finding of this study is that health professionals can play a valuable role in teaching skin cancer prevention.

To assist in these efforts, the goal of this study was to compare methods of teaching skin cancer skills and knowledge, and provide practitioners more information to make decisions about how best to promote skin cancer education and prevention in their patients. Researchers are aware that cost-effectiveness is a growing concern in health care. Skin cancer research is no exception, as evidenced by the recent publication of an article by a private practitioner who found that offering a free mass skin cancer screening was effective in detecting skin cancers and paid for itself by the business it generated (Limpert, 1995). Given the financial concerns under which health professionals must work, the results of this study are helpful. This study discovered that the provision of brochures and reading materials appears to be an inexpensive, practical and effective method of education. While this is new information, there is much to be learned about the best method (or methods) of teaching skin self-examination and further questions to answer before it is determined what's best for educating the general public. However, results of this study can offer researchers a guide for what questions to now pursue.

APPENDIX

A. SKIN EXAMINATION RATING SCALE (SERS)

Circle One

1. Adjusted lighting? Yes No
2. Used full-length mirror? Yes No
3. Used hand-held mirror or commented on "buddy?" Yes No
4. Used stool or chair or hair dryer? Yes No
5. Checked face? Yes No
6. Checked scalp? Yes No
7. Checked chest? Yes No
8. Checked back? Yes No
9. Checked front of neck? Yes No
10. Checked back of neck? Yes No
11. Checked left side of body? Yes No
12. Checked right side of body? Yes No
13. Checked top of left arm? Yes No
14. Checked top of right arm? Yes No
15. Checked bottom of left arm? Yes No
16. Checked bottom of right arm? Yes No
17. Checked top of left hand? Yes No
18. Checked top of right hand? Yes No
19. Checked palm of left hand? Yes No
20. Checked palm of right hand? Yes No
21. Checked front of left leg? Yes No
22. Checked front of right leg? Yes No
23. Checked back of left leg? Yes No
24. Checked back of right leg? Yes No
25. Checked top of left foot? Yes No
26. Checked top of right foot? Yes No

27. Checked sole of left foot? Yes No
28. Checked sole of right foot? Yes No

Total # of Yes's Circled (0-28) ________
Total time of skin exam_____(min.)_____(sec.)

B. KNOWLEDGE QUESTIONNAIRE (KQ)

Part I: Please answer the following questions to the best of your ability. Circle your answer.

1. What is the sun protection factor (SPF) most often recommended by doctors to help protect your skin from the sun?
    a) 3
    b) 5
    c) 10
    d) 15

2. What percentage of skin cancers are curable?
    a) 20%
    b) 50%
    c) 75%
    d) 90%

3. A sunscreen with an SPF rating of 15...
    a) means that most people can stay out in the sun for 15 minutes without risk of sunburn
    b) has 3 times as much sun blocking agent as a sunscreen with an SPF of 5
    c) means that skin covered by the sunscreen can be exposed to sun rays for 15 times longer before burning the skin with no sunscreen
    d) affords adequate protection against sun rays for up to 4 hours

4. The sun is strongest between the hours of:
    a) 8:00 AM - 12:00 PM
    b) 10:00 AM - 2:00 PM
    c) 12:00 PM - 4:00 PM
    d) 2:00 PM - 6:00 PM

5. What percentage of all skin cancers result from too much exposure to sunlight?
    a) 20%
    b) 50%
    c) 75%
    d) 90%

6. In young children, a bad sunburn can cause:
    a) dehydration
    b) delirium
    c) irregular heartbeat
    d) dangerously low blood pressure
    e) all of the above

7. Doctors recommend treating a child's sunburn by:
    - a) rubbing in a moisturizing lotion
    - b) applying alcohol to the affected area
    - c) soaking the affected area in lukewarm water
    - d) dabbing on a calamine lotion that has an antihistamine
    - e) all of the above

Part II: Please answer the following questions by circling either "T" for true or "F" for false.

8. T F Once skin cancer has been successfully treated, it rarely occurs again in the same person.

9. T F Melanomas are usually brown, symmetrical, and raised slightly above the skin line.

10. T F The frequent use of sunglasses and a broad-brimmed hat during childhood may reduce your risk of cataracts later in life.

11. T F It is usually recommended by doctors that sunscreens are most effective when applied after the child has been exposed to the sun for about 10 minutes.

12. T F Almost all wrinkling of the skin that is common in adulthood can be attributed to the normal aging process.

13. T F One blistering sunburn during childhood can more than double your chances of developing malignant melanoma.

14. T F Sunscreens should be reapplied every 2 hours, even during cloudy or hazy days.

15. T F Sun tanning in a tanning salon or booth is a safer way to tan than direct exposure to the sun.

16. T F Sun exposure on a hot day is more harmful than sun exposure on a cold day.

17. T F It is possible to tan safely.

18. T F You cannot get sunburned on a cloudy day.

19. T F Putting baby oil on yourself or a child before going outdoors offers added protection from the sun.

20. T F The majority of sun damage to a person's skin occurs in the first 18 years of life.

21. How would you rate your current knowledge of skin cancer and sun exposure?

1	2	3	4	5
poor		good		excellent

C. DEMOGRAPHIC DATA FORM (DDF)

Coding ________
Date__________

GENERAL INFORMATION

We would like to know more about peoples' knowledge and skills concerning skin protection and skin cancer. Your responses on this, and the following tasks, will provide health professionals with a more comprehensive understanding of peoples' knowledge and skills in these areas. All information you provide to us will be kept in the strictest confidence. **Please do not put your name on this.**

1. You are: male or female (circle one)

2. Your age is ______

3. What is your ethnic background? (check one)
White______ Hispanic______ Black________ Asian_______
Native American________ East Indian________Other_______

4. Circle the highest grade you completed
K 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

5. What is your current or most recent occupation?

____

6a. What is your marital status? (check one)

single, never married____
married______
separated______
divorced_______
widowed_______
other (please explain)

____

If you are married, please answer the next questions. If not, please skip the next three questions and continue on.

6b. What is your spouse's age? ______

6c. Circle the highest grade completed by your spouse
K 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

6d. What is your spouse's current or most recent occupation?

____

7. Please list the number of children you have ______ and their ages _______

8. After 45 to 60 minutes in the sun, with no oil, lotion or sunscreen on your skin, you have...(please circle one)

a) A painful burn the next day and no tan one week later.
b) A painful burn the next day and a light tan one week later.
c) A slightly tender burn the next day and a moderate tan one week later.
d) No burn the next day and a solid tan one week later.

9. How many painful (e.g. blistering, etc.) sunburns have you had in your lifetime?

____

10. Does anyone in your family have a history of skin cancer?
YES or NO (please circle one)

11. Do you know anyone who has had or currently has skin cancer?
YES or NO (please circle one)

12a. Do you feel you are generally informed about skin cancer and sun protection?
YES or NO (please circle one)

12b. If YES, where did you learn about skin cancer and sun protection? (please check all that apply)

_____ television, newspaper or magazine
_____ doctor or health professional
_____ family member or friend
_____ school or classroom setting
_____ other (please explain)____________________________

13a. Do you have a swimming pool at your home or apartment?
YES or NO (please circle one)

13b. If YES, approximately how many times per month do you use it during the summer?

____

14. How many times have you visited the beach in the past year? ____________

15. How long (in hours) do you usually stay at the beach?_______

16. Do you think a suntan enhances your appearance?
(please circle one) YES or NO

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BIOGRAPHICAL SKETCH

Tanya Johnson Mickler was born on January 28, 1969, in Rockledge, Florida, to Jean and Edward Johnson. She graduated with honors from Stanton College Preparatory School in Jacksonville, Florida, in 1986. Tanya attended Vassar College and majored in psychology. She graduated cum laude with a Bachelor of Arts degree in 1990. Tanya entered the clinical and health psychology program at the University of Florida in August 1990, and received her Master of Science degree in 1994. She married Chris Mickler in March of 1994. Upon completing her doctoral degree at the University of Florida, she intends to work with children, adults, and families in the field of clinical psychology.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

James R. Rodrigue, Chair
Associate Professor of Clinical and Health Psychology

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

James Johnson
Professor of Clinical and Health Psychology

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Suzanne Bennett Johnson

Suzanne Johnson
Professor of Clinical and Health Psychology

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

James Algina

James Algina
Professor of Foundations of Education

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Henry Pennypacker
Professor of Psychology

This dissertation was submitted to the Graduate Faculty of the College of Health Professions and to the Graduate School and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

August 1997

Robert G Frank

Dean, College of Health Professions

Dean, Graduate School